REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested.

Claims 1-15 are pending in this application. Claims 1-3, 5-8, 11-13, and 15 were rejected under 35 U.S.C. §102(b) as anticipated by U.S. patent 4,185,223 to Anezaki. Claims 4, 9, and 14 were rejected under 35 U.S.C. §103(a) as unpatentable over Anezaki. Claim 10 was rejected under 35 U.S.C. §103(a) as unpatentable over Anezaki in view of U.S. patent 4,919,634 to Ito et al. (herein "Ito").

Addressing the above-noted rejections, those rejections are traversed by the present response.

Applicants respectfully submit the basis for the outstanding rejection has not properly considered each of the claim limitations. Specifically, independent claim 1 recites:

> wherein a surface of the first grind electrode is formed to be a rough surface having a higher degree of ***surface roughness*** than a surface of a second grid electrode located adjacent to the first grid electrode (emphasis added).

The other independent claims recite a similar feature. Applicants respectfully submit that Anezaki is completely silent as to a surface roughness of any of the grid electrodes.

The basis for the outstanding rejection with respect to the above-noted feature appears to indicate that a first grid electrode 18 in Anezaki has a higher surface roughness than a second grid electrode 20 because Figure 1 in Anezaki indicates a "first grid electrode shows a contour surface and second grid electrode shows a flat surface".[1] That is, the basis for the outstanding rejection appears to rely on the fact that the first grid electrode 18 in Anezaki is not flat whereas the second grid electrode 20 is flat. However, applicants respectfully submit that basis for the outstanding rejection is misconstruing the concept of a surface roughness.

A concept of "surface roughness" is well understood in the art and would be well understood from the present specification to indicate a surface with microscopic unevenness

[1] Office Action of May 4, 2005, page 2, line 18.

on the order of several μm on a metal surface. Surface roughness is not related to whether a surface is flat or not, such as was relied upon in the outstanding rejection citing the teachings in Anezaki. In fact the present specification specifically states "[h]owever, since the coin portion 22 and thin (recess) portion 24 are formed by pressing the material 20, the surface unevenness may easily be flattened".[2] From this portion of the specification it is clear that even a completely flat surface can have the claimed surface roughness, again because surface roughness is well understood in the art to be roughness on the order of several μm.

Applicants respectfully submit it is evident that the "surface roughness" recited in the claims clearly differs from that relied upon in Anezaki with respect to grid electrode 18 not being completely flat. In contrast to the claimed features, Anezaki discloses bead 38, beading 20, and recess 16 that forms an unevenness on the order of hundreds of μm formed by a general melting processing method, such as pressing a metal material. However, such a structure in Anezaki is completely unrelated to a concept of surface roughness as in the present invention.

Applicants also note such differences between the present invention and Anezaki are also evident from the differences in operations realized by the present invention and the device in Anezaki.

As discussed in the present specification for example at page 7, lines 16-17 a first grid electrode in the present invention can include a bead portion 23, and as noted at page 8, lines 1-3 the first grid electrode can in a non-limiting embodiment have a thin circular portion with a thickness of about 0.06 mm to 0.08 mm. Thus, as evident from the present specification, and also for example in Figure 4 in the present specification, the height of the bead portion 23 can be more than four times greater than the thickness of the thin circular portion in the first grid electrode.

[2] Present specification at page 11, line 27 to page 12, line 3.

If the bead portion 23 in the present invention, which at most would correspond to the teachings in Anezaki of the contour in electrode 18, is defined to be a surface roughness as would be a correspondence based on the assertions in the Office Action, the height of it would be more than 0.2 mm (200 μm). Further, in the assertion in the Office Action the relied upon surface roughness of the bead 38 in electrode 18 in Anezaki would also be in the order of hundreds of μm, as is evident from the drawings in Anezaki. If such was assumed to be a surface roughness the advantages of the present invention could not be realized. Instead, as noted in the present specification at page 9, lines 7-15 unnecessary electron emission may easily be induced by the potential of the first grid electrode, thereby resulting in problems.

Also, for reference applicants attach hereto the definition of "surface roughness" from the McGraw-Hill "*Dictionary of Scientific and Technical Terms*", Fifth Edition. Applicants respectfully submit such a submission makes it further clear how one of one of ordinary skill in the art would understand the term "surface roughness" recited in the claims. Such a definition clearly differs from any reliance on the teachings in Anezaki.

Further, applicants respectfully submit the treatment of certain of the dependent claims requiring specific features of the surface roughness, such as dependent claims 4, 9, and 14, is even further improper. With respect to those claims the outstanding Office Action has not properly considered such features and merely notes that it would have been obvious to one of ordinary skill in the art to provide such surface roughness as "optimization of workable ranges". That basis for the outstanding rejection is further traversed. That is, as noted above in detail first Anezaki does not even disclose any concept directed to surface roughness such as in the claims. Further, the claimed ranges of surface roughness in the noted claims is completely unrelated to any concept discussed in Anezaki, nor does Anezaki disclose that any benefits can be realized by maintaining a surface roughness within a certain range. That is, since Anezaki does not even recognize that changing a surface roughness

would have any benefits or influences in the device therein, selecting the specific ranges in the above-noted claims is clearly not merely an optimization of workable ranges of Anezaki. Anezaki does not recognize any characteristic of surface roughness as influencing operation of a grid electrode.

The specification also notes at page 11, lines 9-17 certain benefits realized by utilizing such a claimed range of surface roughness, which is clearly neither taught nor addressed nor even eluded to in Anezaki.

Moreover, no teachings in Ito are cited with respect to the above-noted features or are believed to overcome the above-noted deficiencies in Anezaki.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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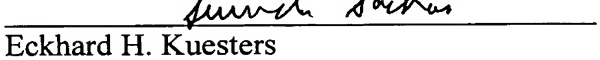

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McGraw-Hill Dictionary of Scientific and Technical Terms

Fifth Edition

Sybil P. Parker
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includes placer mining, mining in open glory-hole or milling pits, mining and removing ore from opencuts by hand or with mechanical excavating and transportation equipment, and the removal of capping or overburden to uncover the ores. { 'sər·fəs ˌmīn·iŋ }

surface-mount technology [ELECTR] The technique of mounting electronic circuit components and their electrical connections on the surface of a printed board, rather than through holes. { 'sər·fəs ˈmaůnt tekˈnäl·ə·jē }

surface navigation [NAV] Navigation of a craft on the surface of the earth; in particular, navigation of vessels on the surface of water. { 'sər·fəs ˌnav·əˌgā·shən }

surface noise [ELECTR] The noise component in the electric output of a phonograph pickup due to irregularities in the contact surface of the groove. Also known as needle scratch. { 'sər·fəs ˌnóiz }

surface of center [MATH] The locus of points that are one of the two centers of principal curvature at some point on a given surface. { ˈsər·fəs əv 'sen·tər }

surface of discontinuity [FL MECH] A surface within a fluid across which there is a discontinuity in fluid velocity; often generated in the wake of a body moving relative to the fluid. [METEOROL] An interface, applied to the atmosphere; for example, an atmospheric front is represented ideally by a surface of discontinuity of velocity, density, temperature, and pressure gradient. { ˈsər·fəs əv ˌdisˌkänt·ən'ü·əd·ē }

surface of Joachimsthal [MATH] A surface such that all the members of one of its two families of lines of curvature are plane curves and their planes all pass through a common axis. { ˈsər·fəs əv yō'äk·əmzˌtäl }

surface of Liouville [MATH] A surface that can be assigned parameters u and v such that a linear element ds on the surface is given by $ds^2 = [f(u) + g(v)][du^2 + dv^2]$, where f and g are functions of u and v. { ˈsər·fəs əv 'lyüˌvēl }

surface of Monge [MATH] A surface generated by a plane curve as its plane rolls without slipping over a developable surface. { ˈsər·fəs əv 'mónzh }

surface of negative curvature [MATH] A surface whose Gaussian curvature is negative at every point. { ˈsər·fəs əv ˈneg·əd·iv 'kər·və·chər }

surface of positive curvature [MATH] A surface whose Gaussian curvature is positive at every point. { ˈsər·fəs əv 'päs·əd·iv ˌkər·və·chər }

surface of revolution [MATH] A surface realized by rotating a planar curve about some axis in its plane. { ˈsər·fəs əv ˌrev·əˈlü·shən }

surface of section *See* Poincaré surface of section. { ˈsər·fəs əv 'sek·shən }

surface of translation [MATH] A surface that can be generated from two curves by translating either one of them parallel to itself in such a way that each of its points describes a curve that is a translation of the other curve. Also known as translation surface. { ˈsər·fəs əv tranzˈlā·shən }

surface of Voss [MATH] A surface that has a conjugate system of geodesics. { ˈsər·fəs əv 'vós }

surface of zero curvature [MATH] A surface whose Gaussian curvature is zero at every point. { ˈsər·fəs əv 'zirˌō ˌkər·və·chər }

surface oil-film technique [FL MECH] A method of flow visualization in which a solid surface is coated with a mixture of oil and powdered pigment, and the airstream carries the oil away, leaving a streaky deposit of pigment that provides information on airflow. { ˈsər·fəs 'ȯil ˌfilm ˌtekˌnēk }

surface orientation [PHYS CHEM] Arrangement of molecules on the surface of a liquid with one part of the molecule turned toward the liquid. { 'sər·fəs ˌȯr·ē·ənˈtā·shən }

surface passivation [ELECTR] A method of coating the surface of a p-type wafer for a diffused junction transistor with an oxide compound, such as silicon oxide, to prevent penetration of the impurity in undesired regions. { 'sər·fəs ˌpas·ə'vā·shən }

surface patch [MATH] A surface or a portion of a surface that is bounded by a closed curve. { 'sər·fəs ˌpach }

surface phase [GEOCHEM] A thin rock layer differing in geochemical properties from those of the volume phases on either side. Also known as volume phase. { 'sər·fəs ˌfāz }

surface physics [SOLID STATE] The study of the structure and dynamics of atoms and their associated electron clouds in the vicinity of a surface, usually at the boundary between a solid and a low-density gas. { 'sər·fəs 'fiz·iks }

surface-piercing hydrofoil [NAV ARCH] A hydrofoil which attains its stability by hydrodynamically balancin amount of foil area above and below the water surface. { fəs ˈpirs·iŋ 'hī·drəˌfȯil }

surface pipe [PETRO ENG] The string of casing first set well, usually to shut off shallow, fresh-water sands from tamination by deeper, saline waters. { 'sər·fəs ˌpīp }

surface planer *See* surfacer. { 'sər·fəs ˌplā·nər }

surface plasmon [SOLID STATE] A quantum of a colle oscillation of charges on the surface of a solid induced time-varying electric field. { 'sər·fəs 'plazˌmän }

surface plate [DES ENG] A plate having a very accurate p surface used for testing other surfaces or to provide a true su for accurately measuring and locating testing fixtures. { fəs ˌplāt }

surface pressure [METEOROL] The atmospheric pressu a given location on the earth's surface; the expression is ap loosely and about equally to the more specific terms: st pressure and sea-level pressure. [PHYS] *See* film pres { 'sər·fəs ˌpresh·ər }

surfacer [DES ENG] A machine that is used to dress or p the surface of a material such as stone, metal, or wood. known as surface planer. { 'sər·fəs·ər }

surface reaction [CHEM] A chemical reaction carried ou a surface as on an adsorbent or solid catalyst. { 'sər·fəs rē shən }

surface recombination rate [SOLID STATE] The rate at wh free electrons and holes at the surface of a semiconducto combine, thus neutralizing each other. { ˈsər·fəs rēˌkäm·bə shən ˌrāt }

surface recombination velocity [SOLID STATE] A mea of the rate of recombination between electrons and holes at surface of a semiconductor, equal to the component of the e tron or hole current density normal to the surface divided by excess electron or hole volume charge density close to the face. { 'sər·fəs rēˌkäm·bə'nā·shən vəˌläs·əd·ē }

surface resistivity [ELEC] The electric resistance of the face of an insulator, measured between the opposite sides square on the surface; the value in ohms is independent of size of the square and the thickness of the surface film. { fəs ˌrēˌzis'tiv·əd·ē }

surface retention *See* surface storage. { 'sər·fəs riˌten·cha

surface rights [MIN ENG] **1.** Ownership of the surface l only, mineral rights being reserved. **2.** Ownership of the face land plus mineral rights. **3.** The right of a mineral ow or an oil and gas lessee to use as much surface land as may reasonably necessary for the conduct of operations under lease. { 'sər·fəs ˌrīts }

surface rolling [MET] A cold-rolling process for harden the surface of a metal. { 'sər·fəs ˌrōl·iŋ }

surface roughness [ENG] The closely spaced unevennes a solid surface (pits and projections) that results in friction solid-solid movement or for fluid flow across the solid surf { 'sər·fəs ˌrəf·nəs }

surface runoff [HYD] Runoff that moves over the soil surf to the nearest surface stream. { 'sər·fəs 'rənˌȯf }

surface-set bit [DES ENG] A bit containing a single laye diamonds set so that the diamonds protrude on the surface the crown. Also known as single-layer bit. { 'sər·fəs ˌbit }

surface sizing *See* sizing treatment. { 'sər·fəs ˌsīz·iŋ }

surface soil [GEOL] The soil extending 5 to 8 inches (1 20 centimeters) below the surface. { 'sər·fəs ˌsȯil }

surface state [SOLID STATE] An electron state in a semic ductor whose wave function is restricted to a layer near surface. { 'sər·fəs ˌstāt }

surface storage [HYD] The part of precipitation retai temporarily at the ground surface as interception or depress storage so that it does not appear as infiltration or surface run either during the rainfall period or shortly thereafter. A known as initial detention; surface retention. { 'sər·fəs ˌst ij }

surface temperature [METEOROL] Temperature of the near the surface of the earth. [OCEANOGR] Temperature of layer of seawater nearest the atmosphere. { 'sər·fəs ˌtem·p chər }

surface tension [FL MECH] The force acting on the surf of a liquid, tending to minimize the area of the surface; quan tatively, the force that appears to act across a line of unit len